TECHNICAL GUIDANCE FOR THE DEVELOPMENT OF WILDLIFE & POLLINATOR HABITAT AT SOLAR FARMS

South Carolina Solar Habitat Act — June 2020

South Carolina Solar Habitat

Audubon

SOUTH CAROLINA DEPARTMENT OF NATURAL RESOURCES

CLEMSON COOPERATIVE EXTENSION

dnr.sc.gov/solar

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Cover Photos: top left Sumter Solar, right Monarch Butterfly (photo credit: SCDNR Biologist Pam Corwin); bottom left Indigo Bunting (photo credit: SCDNR Biologist Pam Corwin), right Colleton Solar.

Introduction

The South Carolina Department of Natural Resources (SCDNR) is supportive of renewable energy and innovative ways to continue to support natural resources. In June 2014, Act 236 (SC Code of Laws Title 58 Chapter 39) was signed into law. This legislation required the development of renewable energy facilities as a part of South Carolina's electrical utilities peak demand. This led to South Carolina's solar industry boom. Additionally, in 2019, Act 62 (SC Code of Laws Title 58 Chapter 27 and 41) legislation passed encouraging utilities to develop voluntary renewable energy programs and neighborhood community solar programs. In 2017, according to the Smart Electric Power Alliance, South Carolina was fourth in the country in new solar capacity per state, following behind California, Texas and North Carolina.

While SCDNR is supportive of renewable energy, the increase in solar generation means a new land use on South Carolina's landscape competing with the needs of natural resources. Solar farms can adversely affect valuable natural resources if they are not properly planned and constructed. However, solar developers have an opportunity to provide increased benefits to our natural resources by siting and developing their solar sites wisely and managing them to create habitat suitable for a wide variety of wildlife.

Pollinator habitat consists of flowering, herbaceous native plants and grasses that provide food and cover for pollinators such as bees, butterflies, moths, birds and more. Many of these species that use open prairies and grasslands are in decline in the Eastern United States due, in part, to habitat loss. According to the 2015 SCDNR State Wildlife Action Plan (SWAP), these open land cover types, sometimes called early-successional habitat, have declined dramatically in the last 70 years primarily due to changing agricultural practices, forestry succession, fire suppression and urban/suburban encroachment. The planting of native pollinator plant species not only improves early-successional habitat for a variety of wildlife, but it also aids in reducing soil erosion, protecting water quality and enhancing the aesthetic beauty of a site. Adding pollinator habitat to a solar site can provide benefits to the solar developer and the solar farms' neighbors. This can be done by supporting insects that pollinate agricultural crops, and by reducing maintenance costs associated with mowing and spraying around the panels.

Loggerhead Shrike.
Early-successional Species:
Photo credit: SCDNR Biologist Pam Corwin

Eastern Kingbirds.

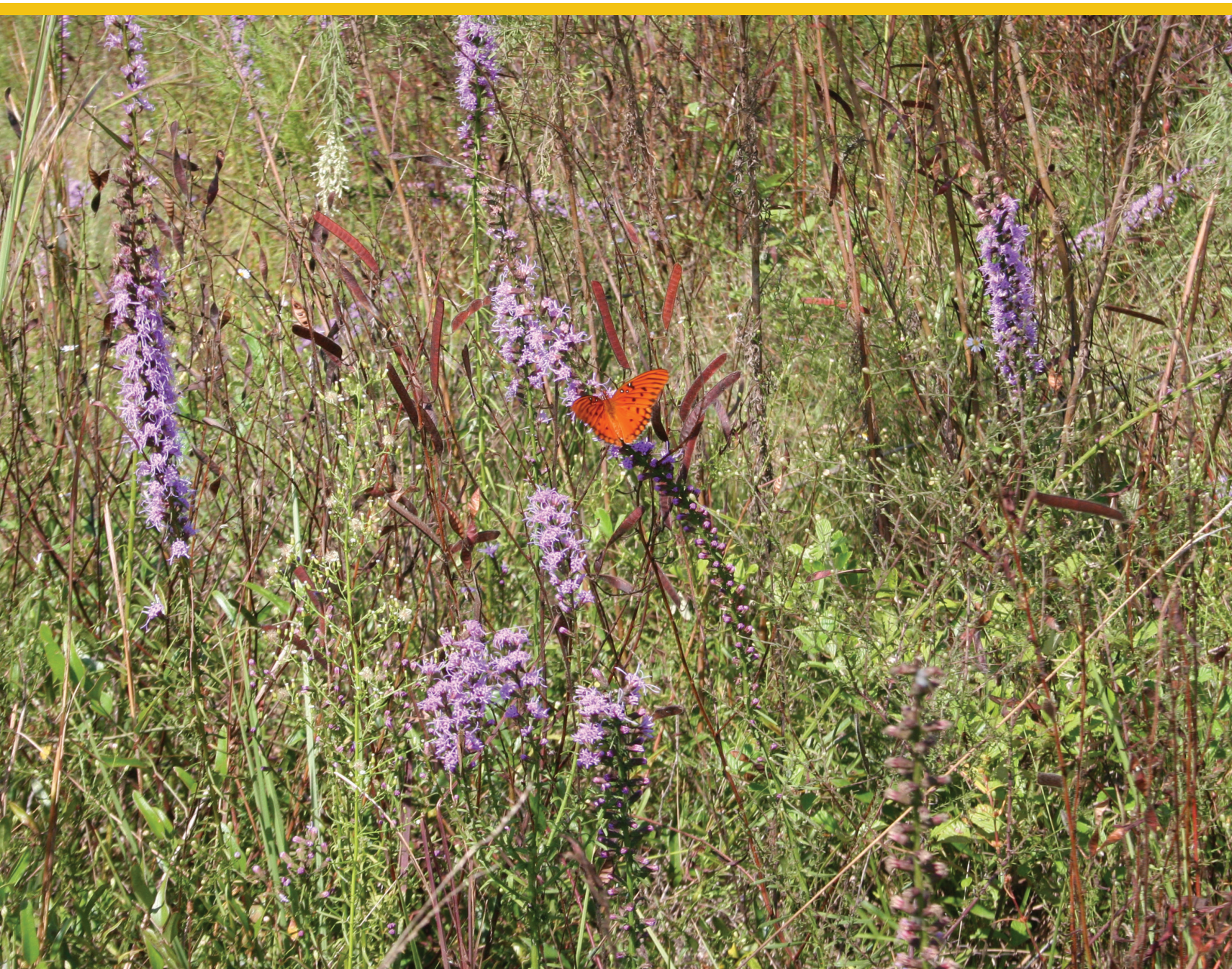
Indigo Bunting.

Spurred from an initiative by Audubon South Carolina with the support of SCDNR, the South Carolina Solar Habitat Act (§50-4-10) was signed into law by Governor Henry McMaster, taking effect on June 1, 2018. The Act provides a voluntary framework to encourage owners of ground-mounted commercial solar energy generation sites to follow voluntary site management practices that:

- Provide native perennial vegetation and foraging habitats beneficial to gamebirds, songbirds and pollinators; and
- Reduce stormwater runoff and erosion at the solar generation site.

Under the authority of the Solar Habitat Act, SCDNR has worked with other state agencies, nonprofit conservation organizations, utilities and solar developers to establish this native habitat and pollinator management guidance for the planning, establishment and management of pollinator-friendly habitat at solar sites in South Carolina. Additional resources pertaining to solar site selection and design consideration are also included in this document.

Gulf Fritillary on *Liatris spicata*
Photo credit: Southern Habitats, LLC



Choosing a Solar Site

The least impactful solar installations occur on top of existing human developments. Rooftop arrays, or arrays built on top of existing disturbed surfaces such as landfills, decommissioned industrial sites and parking lots, are best suited for solar power generation and do not require further habitat conversion, fragmentation or degradation when chosen as locations for solar farms. A tax credit is available to an individual or business that constructs, purchases or leases solar facilities on property located on the Environmental Protection Agency's National Priority List, or equivalent sites, and on a list of related removal actions as certified by the SC Department of Health and Environmental Control (DHEC), such as former industrial sites or landfills[1].

Hannah Solar North Charleston Site.

Hannah Solar Spartanburg Site.

Idle or low-production agricultural lands are often chosen as solar sites. These areas can provide excellent opportunities to establish pollinator habitat and the "edge" habitat utilized by a wide variety of birds, mammals and herpetofauna. Low-production agricultural lands could potentially be improved by several years of proper solar habitat management. If the land will be returned to agriculture following the decommissioning of the solar farm, an explicit decommissioning or reclamation plan should be established early in the planning process.

Pine Gates Renewables Cameron Solar Farm.

Pine Gate Renewables Odyssey Solar Farm.

1 SC Code of Laws §12-6-3770

All sites require careful consideration of the potential environmental impacts by addressing a few simple questions.

- What natural resources are present?
- Will the site need to be cleared and graded?
- Will new access roads or transmission line right-of-ways need to be built?
- Are wetlands or streams present on the site?
- Will adjacent forests need to be cleared or trimmed due to shading effects on panels?
- Are state or federally-listed threatened & endangered species present? Are there any other conservation or cultural resources concerns?

Proper site selection and planning is the first step in determining how project development may affect natural resources. Habitat fragmentation is one of the greatest impacts to the state's natural resources; the loss of contiguous available habitat with food, cover and water for wildlife is a consideration when siting a solar farm near already protected lands.

In general, solar farms should not be sited on or adjacent to:

- Wildlife Management Areas,
- Heritage Trust Preserves,
- State Parks & Forests,
- National Parks & Forests, and
- Other protected lands (conservation easements).

Design Considerations

Streams and Wetlands

Wetland and riparian areas should be protected with a minimum 50-foot upland buffer. A review of the soils onsite via the U.S. Fish & Wildlife Service's (USFWS) National Wetland Inventory[2] and the U.S. Department of Agriculture's Natural Resources Conservation Service's (NRCS) Web Soil Survey Tool[3] can be useful to help identify the potential for wetlands or hydric soils on the proposed solar site. If hydric soils are present on the project site, the site should be configured to avoid all impacts to wetlands or streams and provide a minimum 50-foot vegetated upland buffer to help protect water quality and provide a wildlife corridor. If impacts are unavoidable to wetlands or streams, consult with the U.S. Army Corps of Engineers (USACE) Charleston District[4] to determine if jurisdictional waterbodies are present and if a permit and mitigation is required for activities impacting these areas. Please note that solar site development may also require permits or compliance with local (county or municipal) ordinances or regulations.

2 https://www.fws.gov/wetlands/Data/Mapper.html
3 https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm
4 www.sac.usace.army.mil/Missions/Regulatory

Adding roads or stream crossings on a project site will increase environmental impacts and regulatory burden; these features often require permits for construction. Contact the USACE Charleston District before planning construction in or near streams or wetlands. In-stream structures, such as low flow crossings, bridge footings and culverts, interrupt the natural stream bed and cause sedimentation. If stream crossings must occur, SCDNR recommends the use of bridges or bottomless culverts for all permanent stream or wetland crossings. If traditional culverts are chosen, they should be installed at a minimum of 12 inches below the stream bed and of suitable size to pass bankfull flows; this will ensure continuous aquatic movement up and downstream of the culvert. Improperly sized culverts often erode roadways, streambanks and stream beds, leading to sedimentation, dangerous wash-outs and isolated aquatic organisms. Fords may be appropriate for crossings if used only once or twice a year in ephemeral or intermittent streams.

Stormwater

If construction activities or land clearing activities disturb one or more acres of soil, a stormwater permit from the DHEC is needed[5].

Regardless of the requirement of a permit, erosion control and sediment management should be considered in all phases of the solar site, including the planning, construction, management, and reclamation phases. On steeper slopes, it should be pertinent to protect topsoil and evaluate where flow may concentrate (drip lines) off the panels toward the nearest low-lying area. It is important to slow the rate of flow on steeper slopes by creating areas perpendicular to the flow paths to slow the rate of flow, which increases infiltration of water into the soil.

If a waterbody is located nearby, flow from the construction area and flow paths from established solar panels should be allowed to infiltrate the soil in created wetlands (vernal pools or swales) to protect water quality of the nearby waterbody.

A review of the DHEC Stormwater Best Management Practices Handbook[6] is recommended. To prevent entangling and killing wildlife, wildlife-friendly sediment and erosion control devices should be used. Devices should be composed of biodegradable, natural fibers whenever possible.

Farmlands

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. Prime farmlands are protected under the Farmland Protection Policy Act for solar projects associated with, or funded by, the Federal Government. Consultation should occur with the NRCS if soils onsite are classified as prime farmland or farmland of statewide importance and if the solar site is associated in any way to federal funding (cost-share program, wetland reserve program, etc.). The NRCS Web Soil Survey Tool[7] can be utilized to assist you in identifying if these protected farmlands are on your site.

Infrastructure – Lines, Lighting & Fences

Overhead utility lines should be designed to prevent bird electrocution and collisions. Avoid siting lines in areas where birds concentrate, when possible. Self-supporting towers, which do not require stay wires, are preferred. When possible, design power lines without earth or shield wires. Shield wires are the lines most often associated with bird collisions because they are the highest wire and are smaller in diameter. Install visibility enhancement devices such as marker balls, bird diverters or other line visibility devices on wires to reduce the risk of collision, especially on shield wires. Adequate clearances between energized or grounded parts requires

5 https://scdhec.gov/environment/water-quality/stormwater
6 SCDHEC Best Management Practices https://www.scdhec.gov/Environment/WaterQuality/Stormwater/BMPHandbook/
7 https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Black Vulture.
Photo credit: SCDNR Biologist Pam Corwin

60 inches of horizontal separation and 48 inches of vertical separation. In areas with potential wood storks, the vertical separation should be increased to 60 inches. Where the minimum distance is not feasible, insulate wires, conductors and other critical equipment to render those components neutral. Cross-arms, insulators and other parts of the power lines should have exclusion devices or perch discouragers installed to prevent birds from landing on energized wires. Artificial bird safe perches and nesting platforms should be placed at a safe distance from the energized infrastructure.

The use of minimization measures to reduce impacts to birds can include increasing line visibility, insulating wires to cover exposed connections and increasing the distance between wires to eliminate contact with ground or other energized wires[8].

To minimize impacts to birds during nocturnal activities, lights should be installed such that lamps and reflectors have cut-off shields and use down-lighting to avoid illuminating the nighttime sky. This would also serve to reduce excessive reflection glare and ensure that artificial light is not visible from beyond the project site. All lighting should be of minimum necessary brightness, consistent with operation safety and security. Use lights with automatic controls such as timers, photo-sensors or motion detectors.

Wildlife Corridors

Habitat fragmentation occurs when habitats are bisected or broken down into smaller areas by roads, structures and other development. Fragmentation is problematic for wildlife as it makes it difficult to access the necessary resources to survive and to find mates for reproduction. Many animals need forested areas at least 150-feet wide and ideally more than 300-feet wide to travel between habitats. All efforts should be made in the planning stages for facility activities and uses to avoid bisecting any existing high priority habitats and wildlife corridors on, and adjacent to, the site. This includes the clearing of land and placement of infrastructure, such as panel arrays, transmission lines, roads and other appurtenances that may bisect the important habitat or wildlife corridors.

Species Concerns

All practicable efforts should be made to avoid and minimize impacts to state and federally listed threatened and endangered species, SC State Wildlife Action Plan (SWAP)[9] conservation priority species, and habitat important for these species. SWAP conservation priority species are those species of greatest conservation need, not traditionally covered under any federally funded programs, and were granted priority status as described in the SWAP.

Juvenile White-tailed Deer.
Photo credit: SCDNR Biologist Pam Corwin

8 https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/guidance-documents/electric-utility-lines.php
9 www.dnr.sc.gov/swap

Species are listed in the SWAP because they are:

1. rare, declining or designated as at-risk;
2. there are knowledge deficiencies regarding the species;
3. the species is common in South Carolina but listed rare or declining elsewhere; or
4. the species serves as an indicator of detrimental environmental conditions.

Juvenile Yellow-bellied Turtle.
Photo credit: SCDNR Biologist Will Dillman

SCDNR staff are available to assist you in determining if rare, threatened or endangered species are known to occur on a proposed project site. Please contact SCDNR's species review staff[10] for more information.

The USFWS recommends surveys be conducted on the project site and surrounding area for any potential federally listed species, as well as for those that are federally considered an At-Risk-Species (ARS). It is possible that some of the ARS may be listed under the Endangered Species Act (ESA) during the solar farm's operational life. Coordination with the USFWS should occur in the early planning stages. If federally listed species may be affected by the activity, or if the project has a federal nexus, ESA Section 7 requires consultation with the USFWS[11]. SCDNR and USFWS recommend that the project avoid impacts to all federally listed species.

State-listed Species Permit Procedures

Gopher tortoise (Gopherus polyphemus) occur in sparse longleaf pine savannas and forests that may seem like prime locations for solar sites. Thus, SCDNR has concerns regarding solar development and the potential impact to the state endangered gopher tortoise[12]. Gopher tortoise cannot be moved, their burrows destroyed, or their burrows scoped, without first obtaining a permit from SCDNR. Before any disturbance or take of gopher tortoise occurs, the areas of impact must be completely surveyed[13] by qualified individuals able to identify all burrows and tortoises. All burrows should be scoped to determine gopher tortoise occupancy. Gopher tortoise may be allowed to be relocated into approved areas as long as relocation plans have been reviewed and approved by SCDNR (contact the SCDNR Herpetologist at 803-546-6062). Before planning a solar farm, check with SCDNR to see if gopher tortoise may be present in your area by contacting the SCDNR Species Review staff.

Gopher Tortoise.
Photo credit: SCDNR

In South Carolina, gopher tortoise are most likely to occur in the Sandhills and Coastal Plain ecoregions of Jasper, Hampton and Aiken Counties; however, there are also known occurrences in Colleton, Dorchester, Bamberg and Allendale Counties. SCDNR recommends gopher tortoise surveys and consultation with the USFWS, in addition to SCDNR, should always occur in the following counties: Aiken, Allendale, Bamberg, Colleton, Dorchester, Hampton and Jasper.

10 speciesreview@dnr.sc.gov; www.dnr.sc.gov/species/
11 https://www.fws.gov/southeast/charleston/project-planning
12 www.dnr.sc.gov/cwcs/pdf/GopherTortoise.pdf
13 www.fws.gov/southeast/pdf/methodology/gopher-tortoise-survey-handbook.pdf

Spotted Turtle
Photo Credit: SCDNR Herpetologist Andrew Grosse

Spotted turtle (*Clemmys guttata*)[14] are a state threatened species and a federal ARS. These semi-aquatic turtles are not an abundant species in South Carolina, but they can be common in appropriate habitat throughout the Coastal Plain. Spotted turtle can be found inhabiting a variety of wetland types including small ponds and streams, swamps, flooded forests and other shallow bodies of water such as isolated wetlands. However, there are individuals, particularly males, that wander some distance from wetlands, especially during the spring. This species is difficult to find during the summer months and may undergo a period of summer dormancy (aestivation) in some areas. If the project could permanently alter spotted turtle habitat or temporarily disturb spotted turtle, relocations may be allowed, as long as relocation plans have been reviewed and approved by SCDNR (contact the SCDNR Herpetologist at 803-546-6062). Before planning a solar farm, check with SCDNR to see if spotted turtle may be present in your area by contacting the SCDNR Species Review staff[15].

Federally-listed Species Permit Procedures

Due to their federal protections under the ESA, the following species have established impact areas in which a permit for activities would be triggered. Please contact USFWS for further information regarding their consultation or survey requirements.

Red-cockaded woodpecker (*Picoides borealis*) are listed as endangered by the state and federal government, as well as protected under the Migratory Bird Treaty Act. Red-cockaded woodpecker nest in mature pine forests in the Piedmont and Coastal Plain of South Carolina. This species cannot be taken, killed or possessed, nor can their cavity trees be destroyed or disturbed without a permit from the USFWS. Areas of impact must be surveyed by qualified individuals able to identify red-cockaded woodpecker by sight and sound, as well as identify foraging and nesting habitat and the associated cavity trees. All red-cockaded woodpecker cavity trees should be reported to SCDNR via email at rcwreport@dnr.sc.gov. If a red-cockaded woodpecker nest or cavity tree is located within 0.5 miles of the impact area, the USFWS must be contacted to determine if a permit is required. During the planning phase of a solar site, check with SCDNR species review staff[16] to see if red-cockaded woodpecker may be present in the project area. Please contact USFWS for further information regarding their consultation process and contact SCDNR or USFWS for survey requirements.

Red-cockaded Woodpecker.
Photo credit: SCDNR

14 http://www.dnr.sc.gov/cwcs/pdf/SpottedTurtle.pdf
15 speciesreview@dnr.sc.gov; www.dnr.sc.gov/species/
16 speciesreview@dnr.sc.gov; www.dnr.sc.gov/species/

Wood stork (*Mycteria americana*) are listed as a federally threatened and state endangered species, as well as protected under the Migratory Bird Treaty Act. Although nesting sites or wading bird rookeries may not be located nearby or on the project site, wood stork and other wading birds may seasonally use the water features located on or near the property. If the project site is within 2,500 feet of a wood stork rookery or within 1,000 feet of a known wood stork roosting area the USFWS must be contacted to determine if additional requirements or actions are necessary. During planning for the solar site, check with SCDNR species review staff[10] to see if wood storks may be present in the project area. Please contact USFWS for further information regarding their consultation process and SCDNR or USFWS for survey requirements.

Wood Stork.
Photo credit: SCDNR

Egret Rookery, very similar to the appearance of a wood stork rookery.
Photo credit: Retired SCDNR employee Bill Anderson

Bald eagle (*Haliaeetus leucocephalus*) are a state listed threatened species and are also protected under the federal Bald and Golden Eagle Act and Migratory Bird Treaty Act. Bald eagle nest in large trees with an open limb structure that are usually located on the edges of forests and marshes within approximately 0.5 mile from open water. Bald eagle cannot be taken, killed or possessed, nor the nests destroyed or disturbed without a USFWS permit. Areas of impact must be surveyed by qualified individuals able to identify bald eagles by sight and sound, as well as identify preferred habitats and nests. All bald eagle nests should be reported to SCDNR[17]. If a new nest is discovered, please ensure it is an undocumented nest by using the current SCDNR documented bald eagle nests information available online. To report an undocumented nest, please visit the SCDNR website and complete the reporting form. If a bald eagle nest is within 660 feet of the impact area, the USFWS must be contacted to determine if a permit is required. During planning for the solar site, check with SCDNR to see if bald eagle may be present in the project area. Please contact USFWS for further information regarding their consultation process and SCDNR or USFWS for survey requirements.

Immature Bald Eagle.
Photo credit: SCDNR Biologist Pam Corwin

Adult Bald Eagle.

17 http://www.dnr.sc.gov/wildlife/baldeagle/locations.html

Northern long-eared bat (*Myotis septentrionalis*) are listed as federally threatened. Incidental take of northern long-eared bats is allowed for actions outside of the WNS Buffer Zone[18]. An incidental take permit from the USFWS, under Section 10(a)(1)(B) of the ESA, may be required if activities are occurring within the WNS Buffer Zone and they are not related to specific forest management, native prairie management, minimal and hazardous tree removal, or maintenance/expansion of existing right-of-ways and transmission corridors, as outlined in the 4(d) rule as exemptions. Minimal tree removal only refers to an impact of one acre or less of contiguous habitat or one-acre total within a larger tract. Additionally, an incidental take permit would be needed, under Section 10(a)(1)(B) of the ESA, if activities were:

- occurring within ¼ mile of a known northern long-eared bat maternity roost tree or hibernacula (areas occupied by bats during the winter months);
- cutting or destroying an occupied roost tree from June 1 to July 31 (during the pup season); or
- clearcutting within a ¼ mile of known, occupied roost trees from June 1 to July 31.

Again, if the project activities were related to specific forest management, native prairie management, minimal and hazardous tree removal, or maintenance/expansion of existing right-of-ways and transmission corridors, as outlined in the 4(d) rule, an incidental permit would not be needed. During the planning phase of a solar site, check with SCDNR species review staff[19] to see if northern long-eared bat may be present in the project area. Please contact USFWS for further information regarding their consultation process and contact SCDNR or USFWS for survey requirements.

Northern Long-eared Bat.
Photo Credit: SCDNR Biologist Jennifer Kindel

18 https://www.fws.gov/Midwest/endangered/mammals/nleb/pdf/WNSZone.pdf
19 speciesreview@dnr.sc.gov; www.dnr.sc.gov/species/

BMPs for Site Selection, Design & Construction

- **Setback** facilities away from streams, wetlands and protected lands. Wetland and riparian areas should be protected with a minimum 50-foot vegetated upland buffer.
- Maximize stream and wetland buffer widths and avoid use of chemical treatment within recommended buffers, other than when necessary to control invasive species. Be sure to follow manufacturer's instructions when applying chemical herbicides.
- Plan **wildlife corridors/habitats** around and within large arrays. Maintain connectivity of forest patches.
- To prevent entangling and killing small wildlife, install biodegradable, natural fiber, non-plastic, wildlife-friendly sediment and erosion control devices prior to any land clearing.
- Consult with SCDNR for design considerations and species review of the project site.
- Coordinate with DHEC and the USACE for necessary permits.
- **Lights** should be installed such that lamps and reflectors have cut-off shields and use down-lighting, so the direct lighting does not illuminate the nighttime sky, is not visible from beyond the project site. All lighting should be of minimum necessary brightness consistent with operation safety and security. Use lights with automatic controls such as timers, photo-sensors, or motion detectors.
- If additional overhead **transmission lines** will be installed, measures to minimize impacts to birds should be implemented. These can include increasing line visibility, insulating wires to cover exposed connections, and increasing the distance between wires so no contact with ground or other energized wire can be made.

Santee Cooper Bell Bay Solar Site.
Photo by Paul Zoeller

Establishment and Management of Solar Habitat

Soil

Identify the soil types on the project site. Contact Clemson Extension[20] and/or the local Soil & Water Conservation District Office. Identify the predominant soil type for the solar site with the NRCS Web Soil Survey.[21] Once the soil type has been identified, contact the local Soil & Water conservation district and determine the most appropriate native pollinator plant mix for the site and the appropriate planting density. The district staff can provide assistance in identifying vendors that can provide these native seed mixes and/or live stakes.[22]

Painted Lady Butterfly.
Photo credit: SCDNR Biologist Pam Corwin

Pollinator Seed Mixes

The more diverse the native pollinator seed mix, the greater the potential benefit. When possible, include a variety of herbaceous plants and grasses in the seed mix. Native pollinator seed mixes may be more expensive than other wildflower seed mixes that often include non-native species. However, the higher initial cost of native seed mixes will be offset by the reduced maintenance costs (i.e., frequency of mowing), the need for fertilizers and supplemental watering. When selecting a seed mix, be sure seeds are from a reputable vendor that can certify that the mix is free of noxious, invasive weeds. Local Soil & Water Conservation District or local Clemson Extension offices can assist you in locating a reputable seed supplier.

Identify planting zones in the solar array and select native seed mixes suitable to each zone. Be sure to use native seed mixes appropriate for the ecoregion and soils of the site. To provide variation of habitat and increased diversity for the solar site, SCDNR recommends three zones:

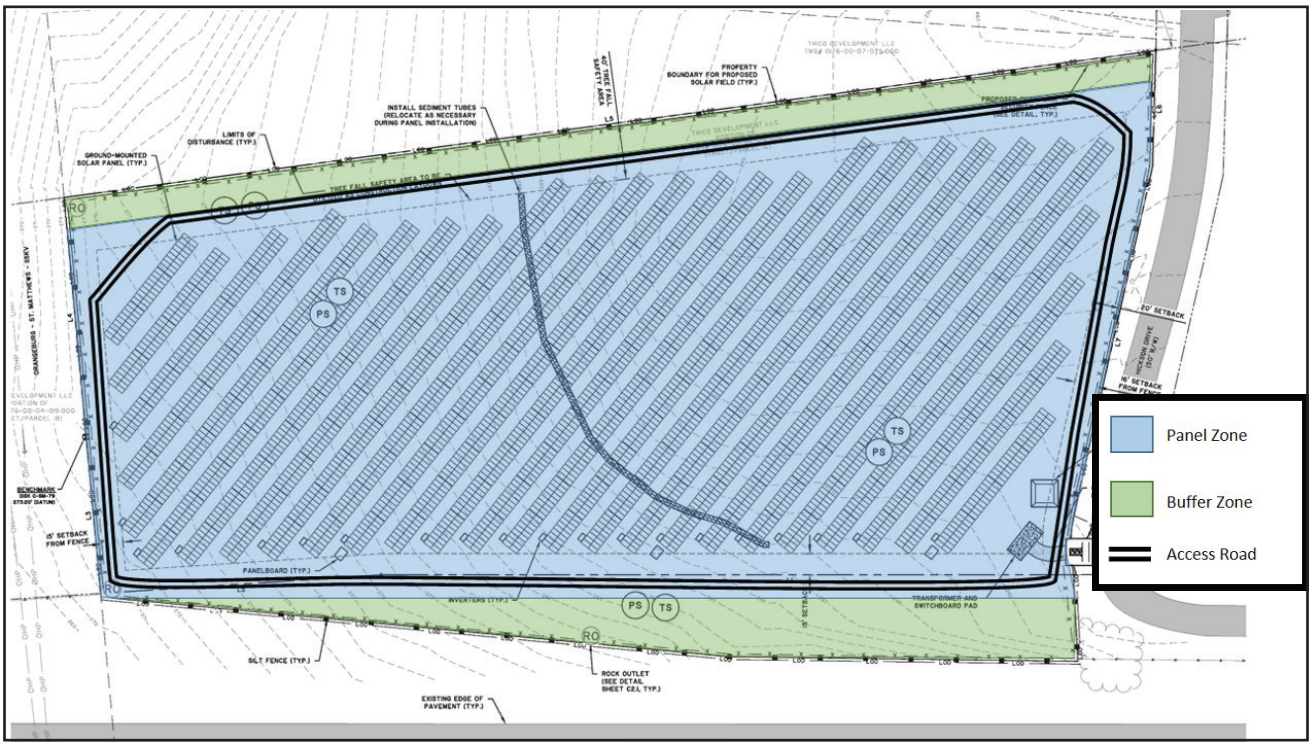
(1) Panel Zone (maximum height on average 24 inches, but will vary dependent on mounting system inside the security fence): These very-low-growing pollinator mixes may include low-growing grasses, native forbs and naturalized (non-native) clover species for planting beneath and between panels. Ideally, there should be at least three plant species in bloom from April to September. Avoid including taller native warm season grasses in this mix, as such species would require frequent mowing to avoid shading panels. The taller warm season grasses, such as big bluestem (*Andropogon gerardii*), and Indiangrass (*Sorghastrum nutans*) should not be used in the Panel Zone, but instead be included in the Buffer Zone seed mixes. It is recommended, when possible, to increase the height of the bottom edge of the panels to accommodate a greater diversity of native species and allow for easier and less-frequent mowing. A distance of 36" from the ground surface is recommended to increase benefits while keeping installation costs relatively low.

(2) Buffer Zone: (maximum height on average 4 feet, around the perimeter both inside and outside the security fence): The Buffer Zone should be more diverse and include some of the taller native plants, providing a contrast with the very-low-growing pollinator mix in both height and species composition. Include at least 5% of native warm season grasses (Indiangrass, big bluestem and little bluestem (*Schizachyrium scoparium*)) and incorporate other pollinator species that would not otherwise be suitable in the Panel Zone due to height restrictions. Greater plant diversity in the Buffer Zone will help attract a wide variety of butterflies, hummingbirds, moths and bees to the site. In addition, this

20 www.clemson.edu/public/regulatory/ag-srvc-lab/soil-testing/index.html
21 https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm
22 http://www.dnr.sc.gov/conservation/index.html

zone will provide cover for many songbirds and small mammals that will forage and find refuge on the solar site. Be advised that the maximum height of these plants may be limited by your security requirements. Work with your seed supplier to maximize height and diversity of the species in this mix according to your security needs.

(3) Long-Term Refuge Zone: Many solar sites may come with existing isolated, forested wetlands or areas that are otherwise undesirable or undevelopable for solar arrays or infrastructure. It is recommended that you designate these areas as Long-Term Refuge Zones to be managed for wildlife. Additionally, if the site does not include one of these Long-Term Refuge Zones, create one by setting aside an area at least 10% of the size of the Buffer Zone. The Long-Term Refuge Zone should be managed as a long-term wildlife refuge and be excluded from frequent maintenance activities. The placement of this zone should take into consideration potential long-term shading effects that may impact solar panel operation. Approximately 1/3 of this zone should be mowed every other year to prevent establishment of weedy and invasive species. Consider planting small trees and shrubs that are beneficial to wildlife but be sure to clearly mark planted woody species to avoid damage during mowing. Recommended low-growing native pollinator tree and shrub species include: Chickasaw plums (*Prunus angustifolia*), southern wax myrtle (*Myrica cerifera*), smooth sumac (*Rhus glabra*), southern crabapple (*Malus angustifolia*) and American beautyberry (*Callicarpia americana*).



Example of a typical solar habitat site with a Panel and Buffer Zone.

Preparation & Planting

Santee Cooper Colleton Solar Site.
Photo by Paul Zoeller

Prior to beginning any land disturbing activity, appropriate erosion control measures, such as silt fences, silt barriers or other devices, should be placed between the disturbed area and any nearby waterways and maintained in a functioning capacity until the area is permanently stabilized. If a project involves more than one acre of land clearing or ground disturbance, or if disturbance occurs less than one half mile from a receiving body in the coastal zone, a DHEC stormwater construction permit is required. Please note that many permits issued by DHEC require temporary soil stabilization within 14 days after construction. DHEC is willing to work with solar site developers who intend to plant native vegetation in order to reduce the inspection frequencies required once temporary stabilization has been implemented, as allowed under the current National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Construction Activity[23].

Since native pollinator species may be slow to establish, annual plant species, such as brown top millet, rye, wheat or oats may be used to temporarily stabilize the soil, depending on the soil and season.[24] Please see DHEC's recommendations[25] for timing and soil stabilization as part of the stormwater permit process. Please note that SCDNR strongly recommends against the use of several plant species on the DHEC list for temporary stabilization measures, especially *Sericea lespedeza*, turf grasses (Bermuda and Bahia grass) and other perennial non-native grasses (e.g., weeping lovegrass). These plants can grow aggressively, crowding out native plants and would require expensive herbicide application to eliminate these species before planting a native pollinator seed mix.

Photo credit: Southern Habitats, LLC

Established turf grasses and weeds outcompete native pollinator species. Existing vegetation must be removed before establishing the solar pollinator habitat. Apply a non-persistent herbicide while undesirable plant species are actively growing. Cool-season plants, usually dormant in the summer, may require a second treatment in the winter. Many herbicides require that you wait at least 72 hours after any application before planting the seed mix. Be sure to follow all label instructions and advisories.

23 See Section 4.2. B https://www.scdhec.gov/sites/default/files/docs/Environment/docs/CGP-permit.pdf
24 http://www.scdhec.gov/sites/default/files/docs/Environment/docs/Appendix_C.pdf
25 DHEC Stormwater Temporary Seeding http://www.scdhec.gov/sites/default/files/docs/Environment/docs/erostSeeding.pdf

In South Carolina, planting should occur in the coolest months, typically between November and January. Be sure to check with local Clemson Extension or Soil & Water Conservation District offices for optimal planting times. Ensure that the ground is free of turf grasses and weed species. Prepare the ground for planting by raking away the bulk of the dead plant material. Broadcast seeding may work well on bare, prepared ground, but otherwise the use of a native grass seed-drill is recommended. With the broadcast method, only the light raking associated with the clearing of debris is recommended as this will not expose additional dormant weed seeds in the soil. A native grass seed drill is recommended for effective germination in all soils, but will likely be the only effective method in harder clay soils. Different native pollinator seed mixes should be planted in each zone following the application rates recommended by the seed supplier. For more detailed instructions, consult the local Clemson Extension or Soil & Water Conservation District Offices. SCDNR prefers and recommends the use of native warm season grasses and/or other native forbs that would be beneficial for wildlife and pollinators based on the appropriate planting zone. A list of suggested species can be found in Appendix A.

Maintenance

With proper care, solar pollinator habitat should be well established by the end of the second growing season, after which, a regular maintenance schedule should be implemented. A more detailed timeline is as follows:

Year 1 - Mow often, before the vegetation reaches a height of 12 inches. Most of the plants cut during the first year will not be the planted pollinator species. Frequent mowing will reduce pressure from competing species on pollinator species, which spend the first growing season developing deep root systems. Later in the growing season, mow with the mower deck height set 5 inches above the ground (12 inches above the ground if gopher tortoise may be present) before the vegetation produces seed.

Year 2 - Rake away debris just before the growing season; this will help distinguish weeds from pollinator plants. Look for biennial weed species; remove manually or by spot treatment with herbicide. Mow sparingly, just as biennial weed species are about to flower. Keep the mower deck high enough, greater than 6 inches (12 inches above the ground if gopher tortoise may be present) to stay above the native pollinator plants, but low enough to remove flower heads from weed species before they have a chance to produce seed.

Year 3 - Pollinator species should be well established, but select spraying and/or mowing may still be needed. Mow just before the growing season with the mower deck height 5 inches above the ground (12 inches if gopher tortoises may be present). Other than spot-mowing for weeds, try not to mow again until after the growing season or, if possible, wait until next spring since the seeds and stems of the native plant species provide food and shelter for overwintering wildlife. By now, migratory birds may be nesting in the ample ground cover. To avoid impacts to birds during nesting season, SCDNR recommends that mowing should not occur in established pollinator habitat between April 1 and September 1. When mowing during the growing season cannot be avoided, set the mower deck as high as possible (no lower than 6 inches, preferably higher; 12 inches if gopher tortoises may be present) so native herbaceous vegetation will not be damaged.

Note: If the state-endangered gopher tortoise is present on the site, the mower deck should not be lower than 12 inches. Mowing lower than 12 inches may result in the take of this protected species. Any take of gopher tortoise requires a permit from SCDNR.

Eastern Tiger Swallowtail.
Photo credit: SCDNR Biologist Pam Corwin

When using pesticides, proper application and careful and coordinated timing can significantly reduce pollinator mortality. Use an Integrated Pest Management (IPM) approach which includes proper pest identification, monitoring, and evaluating all available factors in the environment potentially contributing to a pest problem. IPM solutions can include mechanical removal of pests or setting a tolerance threshold. IPM does not mean land stewards automatically use pesticides to eliminate pests. Carefully diagnose your pest problem, and, before you apply a pesticide, make sure the pest population has reached a level where chemical control is necessary. As always, consult with your local County Extension Agent and if a pesticide is needed remember to follow the label instructions. Further information on the rules and regulations regarding pesticides and if the applicator must obtain a pesticide applicators license prior to making a pesticide application in the state of South Carolina can be obtained from Clemson Regulatory Services Department of Pesticide Regulations.[26]

Long-Term Management

Once pollinator habitat is well established, which generally occurs following two to three successful growing seasons, it should no longer require regular mowing during the growing season. However, keep in mind that South Carolina native plants are well adapted to regular disturbance. Historically, this occurred when wildfires swept across the landscape or as a result of grazing from large herbivores, such as bison or elk. Occasional mowing during the winter or early spring can mimic that historic disturbance regime and help keep invasive weeds and woody plants from colonizing.

Mowing should occur well after the growing season, ideally in the late winter or early spring (February – March). Routine mowing should occur on only one third of the site every year, so that every stem is cut only once every 3 years. Mowing small paths for regular maintenance check-ups, conducted on an annual basis, should not cause substantial damage to the site provided that the mower deck is set higher than 6 inches above the ground (12 inches if gopher tortoises may be present). In the Long-Term Refuge Zone, mow less often, mowing only one third of the site every other year, avoiding planted native shrubs and trees, so that every stem is cut only once every 6 years.

26 https://www.clemson.edu/public/regulatory/pesticide-regulation/

BMPs for Solar Pollinator Habitat Establishment and Maintenance

- **Know your soil.** Contact Clemson Extension and/or the local Soil & Water Conservation District Office. Identify the predominant soil type for the solar site to determine the most appropriate native pollinator mix and planting density.
- Establish **planting zones** and cultivate different native pollinator seed mixes in each zone. These zones should vary by the height and sunlight available in each zone. The recommended zones in order from shortest to tallest are: Panel Zone, Buffer Zone, and Long-Term Refuge Zone.
- If possible, wait until spring to conduct **routine mowing** in each zone once the native pollinator habitat is established. The seeds and stems of native pollinator plant species provide food and shelter for overwintering wildlife.
- Taller growing pollinator plant species should be planted around the **periphery of the site** and anywhere on the site where mowing can be restricted during the summer months. Taller plants, left unmowed during the summer, would provide benefits to pollinators, habitat for ground-nesting/feeding birds and cover for small mammals.
- Low-growing/groundcover consisting of native species should be planted **under the solar panels** and between the rows of solar panels. This would provide benefits to pollinators while also minimizing the amount of maintenance. Creating diversity in cover type is beneficial for a variety of wildlife.
- Ensure seeds from the vendor are free of noxious weeds.
- **Mowing** should not occur in established pollinator habitat between April 1 and September 1 to avoid impacts on nesting birds. The mower deck should be set no lower than 6 inches high so native herbaceous vegetation will not be damaged.
- If the state-endangered **gopher tortoise** is present on the site, the mower deck should not be lower than 12 inches. Mowing lower than 12 inches may result in the take of this protected species.

Santee Cooper Colleton Solar Site.
Photo by Paul Zoeller

Landowner Guidance: Reclamation of Solar Sites

Landowners may see increased agricultural yields from soils restored by decades of proper pollinator habitat management. However, the land may not be suitable for agricultural purposes following lease termination unless a site is properly decommissioned. To maintain the integrity of the landscape, SCDNR recommends the inclusion of a decommissioning or reclamation plan in solar contracts or leases with private landowners. A solar site reclamation plan should include provisions for what needs to be removed (posts, underground cables, concrete pads, etc.), who is responsible for reclamation or cleanup after the lease is terminated and details of financial assurances for cleanup. Early in negotiations, the landowner should be sure to include clauses in lease agreements or contracts with the solar developer intended to address the following scenarios:

- In the event the lease is terminated prematurely, who will be responsible for cleanup?
- Who is responsible if the developer leaves panels in place, or large concrete or gravel pads, wiring, etc.?
- What happens if a landowner dies, goes bankrupt, loses the land, etc., who is then responsible for the solar site?
- What happens if the developer goes bankrupt? Who is then responsible for maintenance and reclamation of the solar site?
- Are there protocols and financial assurances in place to deal with abandonment of a solar site?
- What agreements are in place with the solar developer to return the land to its pre-existing condition? What is the intended land-use once the lease term is complete?

BMPs for Landowners

- Be sure to include a **reclamation plan** in contracts or leases. Include provisions for what needs to be removed (posts, underground cables, concrete pads, etc.) and who is responsible for reclamation/cleanup after the lease is terminated.
- Make sure explicit **financial assurances** are included in lease agreements with the "solar prospectors" and the landowners to ensure the integrity of the land is returned upon decommissioning.
- Address the following questions early in your negotiations and be sure to include **clauses** in lease agreements/contracts explicitly addressing:
    - ◊ premature termination of lease,
    - ◊ cleanup of infrastructure and equipment,
    - ◊ transfer of property ownership or status, and
    - ◊ land reclamation state or land-use type (forested, farmland, etc.).

Solar Habitat Certification & Training Program

Solar Habitat Training
Clemson Extension provides a day-long training to help power companies, solar developers and other interested parties learn how to implement pollinator habitat on a solar site. Guidance will be given on:

- the importance and benefit of pollinators and wildlife;
- how to select the right plants or seed mixes for solar site development into a habitat beneficial for pollinators and wildlife while producing energy; and
- how to successfully plant and manage pollinator habitat.

Solar Habitat Certification
To certify a site as solar habitat, a solar developer or landowner must first attend a training and field day provided by Clemson Extension. Available trainings will be linked from www.dnr.sc.gov/solar. After attending a training, the solar developer or landowner will need to apply to Clemson's Department of Fertilizer and Certification Services for certification. A copy of the application is found in Appendix B, but the most recent version can be found on the solar website. As a part of your application, you will need to submit a proposed vegetation management plan for your solar site. A vegetation management template can be found in Appendix C.

Clemson's Department of Fertilizer and Certification Services will process the application, as well as monitor the solar site after planting. The Pollinator Habitat Scorecard for Solar Sites will be utilized to monitor the performance of the solar habitat. A copy of the Pollinator Habitat Scorecard is found in Appendix D.

Sites will be designated "Solar Habitat In Progress" with signage until the inspection occurs following two growing seasons. At such time, if all requirements are met, the site will become certified. Those sites that plant underneath the panels and on edges of property in pollinator plants will be certified as Gold Solar Habitat. Those sites that only plant the edges and not underneath the panels will be certified as Silver Solar Habitat. Certified Solar Habitat signs will only indicate that a site is a Certified Solar Habitat, but the Gold and Silver designations will be included online with the site's vegetation management plan.

Photo credit: Southern Habitats, LLC

Below outlines the steps and process a solar developer or landowner should expect for the Solar Habitat Certification Program.

Step 1: Applicant must attend training and field day.

Step 2: Application submitted to Clemson's Department of Fertilizer and Certification Services. Application submittal will require soil test results and a seed list and the percentage proposed to be planted. Additionally, the landowner will need to describe how they plan to prepare the site, plant and manage the solar site.

Step 3: After application approval, the solar developer or landowner must keep and submit site prep records and any site vegetation maintenance completed (herbicide treatment, grading, disking, etc.) to Clemson's Department of Fertilizer and Certification Services. The site prep records must include dates for activities (planting, disking, herbicide treatment, etc), receipts of seed purchases and photos of the site. Proof of site prep and planting must be provided to Clemson's Department of Fertilizer and Certification Services within 30 days of activities occurring.

Step 4: Following two growing seasons, Clemson's Department of Fertilizer and Certification Services will visit your site to inspect it using the South Carolina Pollinator Habitat Scorecard for Solar Sites form found in Appendix D. This will require an onsite inspection to determine vegetation cover and diversity.

Step 5: Following four growing seasons, Clemson's Department of Fertilizer and Certification Services will visit your site to inspect it using the South Carolina Pollinator Habitat Scorecard for Solar Sites form found in Appendix D. This will require an onsite inspection to determine vegetation cover and diversity. If all plans have been executed, the solar site will be certified.

Step 6: Recertification will occur every five years.

APPENDICES

Butterfly on *Liatris spicata*.
Photo credit: Southern Habitats, LLC

APPENDIX A | Solar Native Plant Species All Zones

SCIENTIFIC NAME	COMMON NAME	EST. MAX HEIGHT	BLOOM TIME
Allium cernuum	nodding onion	1-2′	Summer
Amsonia ciliata (SC ecotype)	fringed bluestar	1-2.5′	Spring
Apocynum cannabinum	hemp dogbane	3′	Summer
Asclepias humistrata	pinewoods milkweed	1-2′	Spring
Asclepias michauxii	Michaux's milkweed	1-1.5′	late Spring
Asclepias tuberosa	butterfly milkweed	1-2.5′	Spring - Summer
Baptisia tinctoria	yellow wild indigo	2.5′	late Spring-early Summer
Chamaecrista fasciculata	large-flower partridge pea	2′	Summer
Chamaecrista nictitans	small-flower partridge pea	1′	Summer-Fall
Cirsium horridulum	yellow thistle	3.5′	Spring-Summer
Clinopodium georgianum	Georgia savory	1′	late Summer - Fall
Conoclinium coelestinum	mist flower	1-2′	Summer - Fall
Coreopsis lanceolata	lance-leaved coreopsis	1-2′	Spring-Summer
Desmodium lineatum	sand tictrefoil	<6″	Summer into Fall
Eupatorium hyssopiflium	lance-leaved thoroughwort	2-4′	Summer
Eutrochium purpureum 'Baby Joe'	dwarf joe pye	2-3′	late Summer - Fall
Fragaria virginiana	wild strawberry/Virginia strawberry	0-1′	late Spring
Gaillardia pulchella	Indian blanket	1-2′	Summer - Fall
Glandularia canadensis	rose vervain	0.5-2.5′	Spring
Helenium autumnale	sneezeweed	3-4′	Summer - Fall
Helianthus hirsutus	rough sunflower	1-3′	Summer - Fall
Lespedeza repens	creeping lespedeza	1-3′	late Spring

SCIENTIFIC NAME	COMMON NAME	EST. MAX HEIGHT	BLOOM TIME
Lespedeza virginica (VA)	slender lespedeza (VA ecotype)	1-2′	Summer-Fall
Liatris microcephala	dwarf blazing star	1.5-2′	Summer
Liatris squarrosa	blazing star	1-2′	Summer
Lobelia cardinalis	cardinal flower	2-4′	Summer - Fall
Monarda punctata	spotted bee balm	1-3′	Summer - Fall
Muhlenbergia capillaris	hairawn muhly	3′	Fall
Packera (Senecio) obovatus	roundleaf ragwort	1-2′	Spring
Phlox nivalis	trailing phlox	1′	Spring
Phyla nodiflora	frogfruit	0.5′	late May - frost
Pycnanthemum incanum	hoary mountainmint	3-6′	Summer
Pycnanthemum tenuifolium	narrowleaf mountainmint	4′	Summer
Rudebeckia hirta	black-eyed susan	2-3′	Spring-Summer
Salvia lyrata	lyreleaf sage	1-2.5′	Spring
Solidago erecta	erect goldenrod	1-3′	Summer - Fall
Solidago nemoralis	gray goldenrod	1-2′	Fall
Symphyotrichum (Aster) lateriflorus	calico aster	4′	Fall
Symphyotrichum patens	late purple aster	2.5′	Summer and Fall
Tephrosia spicata	spiked hoarypea	<1′	Summer
Tephrosia virginiana	goats rue	1-2′	Spring-Summer
Triosteum perfoliatum	late horse gentian	3′	May, June
Viola sororia	common blue violet	0.5′	Spring
Zizia aptera	heart-leaf golden alexander	2′	April, May
Zizia aurea	golden zizia	1.5-3′	April, May

Grasses

SCIENTIFIC NAME	COMMON NAME	EST. MAX HEIGHT	BLOOM TIME
Agrostis hyemalis	winter bentgrass	2-4′	
Carex cephalophora	oval-leaf sedge	1′	Spring- Summer
Carex leavenworthii	Leavenworth's sedge	1′	Spring-Summer
Carex stricta	tussock sedge	3′	
Carex tenax	wire sedge	1′	Spring-Summer
Eragrostis spectabilis	purple love grass	1-2′	
Schizachyrium scoparium	little bluestem	2-4′	
Sorghastrum nutans	indian grass	2-8′	
Tridens flavus	purple top	3-5′	

Shrubs/Trees

SCIENTIFIC NAME	COMMON NAME	EST. MAX HEIGHT	BLOOM TIME
Ceanothus americanus	New Jersey tea	to 3.5′	
Cephalanthus occidentalis 'Sugar Shack'	dwarf button bush	3-4′	
Gaylussacia dumosa	dwarf huckleberry	to 1.5′	
Hypericum hypericoides	St. Andrew's cross	to 3.5′	
Lyonia mariana	stagger-bush	to 5′	
Morella pumila/Myrica pumila	Dwarf Wax Myrtle	2.5′	Spring
Quercus pumila	running oak	to 2.5′	
Rhododendron atlanticum	dwarf azalea	to 5′	
Vaccinium tenellum	small black blueberry	0.5-1.5′	

APPENDIX B | Solar Habitat Application

South Carolina Solar Habitat Site Application

The purpose of this program is to encourage dual benefits of renewable energy with pollinator plants that provide benefit to wildlife and agriculture production.

Items needed for your submittal include:

- Soil test results
- Seed list
- Percentage of seed proposed to be planted
- Site photo

Contact Information

Landowner Name: _____ Solar Site Size: _____ acres

Property Address: _____
(solar site)

Solar Site Coordinates: _____
(latitude/longitude)

Landowner Phone Number: _____ Email Address: _____

Solar Developer or Lease Holder Company Name: _____

Point of Contact Name: _____ Phone Number: _____

Email Address: _____

Vegetation Company Name: _____
(if applicable)

Point of Contact Name: _____ Phone Number: _____

Email Address: _____

South Carolina Solar Habitat Site Prep

The purpose of this section is to is to outline the steps you will take to prepare your site for planting.

1. Describe the existing condition of your proposed solar habitat site. Is it currently in agriculture, barren land or forested?

2. Has herbicide treatment been applied in the past 5 years? ◯ Yes ◯ No

    a. If so, describe which ones that have been applied and when:

3. Describe how you plan to prepare the soil and handle any existing vegetation prior to planting.

4. How do you plan to plant the site?
    - ☐ Broadcast seeding
    - ☐ Drop seeding
    - ☐ Drill seeding
    - ☐ Transplanting plugs or seedlings

5. Where do you plan to purchase your seed? _____

6. List the percentage of your seed mix that you plan to purchase for the following:
    _____% grasses

    _____% forbs (herbaceous flowering plant)

7. What percentage of your seed mix is native plant species?
    _____%

8. Provide a list of plant species you plan to plant and the seeding rates of your seed mix. This can be done as an additional attachment to this form. Please note that it is recommended that at least 4-6 different species be utilized. Additionally, it is helpful to have at least one blooming species per season (spring, summer or fall)

9. Where do you plan to plant pollinator friendly species on your solar site? Check all that apply.

☐ Panel Zone (beneath the panels and in between rows)
☐ Buffer Zone (area on the periphery of the panels inside the security fence)

10. Is there an opportunity to do a vegetated buffer outside of the security fence?

◯ Yes ◯ No

a. If yes, how wide is that vegetated buffer?

☐ Less than 30 ft wide ☐ 30 ft – 49 ft wide ☐ More than 50 ft wide

b. Do you plan to manage this buffer with native species beneficial for wildlife?

◯ Yes ◯ No

c. If yes, please list what native species are present that benefit wildlife or native species you may plant to benefit wildlife.

11. Will there be a Long-term Refuge Zone left or managed within your solar site?

◯ Yes ◯ No

a. If yes, please describe your long-term refuge zone.

12. Provide an overall timeline for the development of your solar site by completing the table below.

Solar Habitat	Activity	Date (Month/Year)
	Order seeds	
In Progress Status	Start site prep (herbicide application)	
	Start soil prep (grading, discing, etc)	
	Plant seeds	
	Year 1 maintenance (mowing, weedeating or herbicide spot spraying)	
	First inspection (after two growing seasons)	
Certified Solar Site	Certified Solar Site signage displayed	
	Second inspection (after four growing seasons)	

Following the implementation of your site prep plan, you will need to provide proof of site prep and planting within 30 days of activities occurring. This will include:

- Site prep records of any site vegetation maintenance completed (herbicide treatment, grading, disking, etc.) and the dates completed.
- Receipts of seed purchases
- Photos of the site

South Carolina Solar Habitat Management

The purpose of this section is to is to outline the steps you will take to manage the pollinator habitat at your solar site.

1. How will you manage your solar habitat site? Check all that apply.

   ☐ Mowing ☐ Herbicide ☐ Weedeating

2. If mowing or weedeating, how often to do you plan to do so?
   - ☐ Once a year
   - ☐ More than once a year
   - Other_____
3. If planning to apply herbicide, which method of herbicide application do you plan to use?
   - ☐ Spot spraying
   - ☐ Grass selective herbicide
   - Other selective herbicide_____
   - Other herbicide method_____
4. Please list all herbicides you plan to use.

Provide a written management plan for your pollinator habitat at your solar site. A management plan outlines the purpose of the land management activity to maintain pollinator habitat and prescribes how that will be conducted. The Technical Guidelines for Development of Wildlife & Pollinator Habitat at Solar Farms should be consulted as you develop your management plan. The Guidelines provide overviews on site preparation and planting and long-term management.

Your management plan should include:

- A description of the plant species that you plan to plant and at what seeding rate and the time of year you plant to plant. If a cover crop (brown top millet, rye, wheat or oats) is planned for use, include that in the plan. Describe where you will plant, whether in the Panel Zone or Buffer Zone.
- Details about mowing frequency, time of year, height of mower deck, etc.
- Details about herbicide application, the type of chemicals used, the mode of spraying, the time of year you plan to spray, etc.

APPENDIX C | Vegetation Management Template

South Carolina Solar Habitat Site Vegetation Management Plan Template

The purpose of this document is to provide a framework for a Solar Habitat Vegetation Management Plan. A management plan outlines the purpose of the land management activity to maintain pollinator habitat and prescribes how that will be conducted. The Technical Guidelines for Development of Wildlife & Pollinator Habitat at Solar Farms should be consulted as you develop your management plan. The Guidelines provide overviews on site preparation and planting and long-term management.

The Vegetation Management Plan should be structured as follows:

A. Existing Site Condition
    a. Describe the existing condition of the site. Is it forested and will have to be cleared? Or is it a fallow or active agriculture field? Are there any stream or wetland features?
    b. What soil types are onsite?
B. Proposed Condition
    a. Describe time of year planting is proposed and what species are planned for planting and at what seeding rate. Describe in percentage of the mixes you plan to plant by grasses and forbs (herbaceous flowering plants). Also, list what percentage of your seed mix is native plant species. Please note that it is recommended that at least 4-6 different species be utilized. Additionally, it is helpful to have at least one blooming species per season (spring, summer or fall).
    b. List your seed sources where you plan to purchase the seed.
    c. Describe where you will plant, whether in the Panel Zone, Buffer Zone or both. Do you plan to manage native species beneficial for wildlife in the vegetated buffer outside of the security fence? If so, describe the width of that vegetated buffer.
    d. If a cover crop (brown top millet, rye, wheat or oats) is planned for use, include that in the plan.
    e. Will your site have a Long-Term Refuge zone? If so, describe what type.
C. Site Preparation
    a. Has herbicide treatment been applied in the past 5 years? If so, list which ones that have been applied and when.
    b. Describe how you plan to prepare the soil and handle any existing vegetation prior to planting.
    c. Describe how you plan to plant the site (broadcast seeding, drill seeding, drop seeding, transplanting plugs or seedlings).
D. Site Management
    a. Describe and provide details about mowing frequency, time of year, height of mower deck, etc.
    b. Describe and provide details about herbicide application, the type of chemicals used, the mode of spraying, the time of year you plan to spray, etc.
    c. Include the name, address, phone number and/or email for any vegetation management company planned to contract for site vegetation management.
E. Site Timeline
    a. Provide an overall timeline for the development of your solar site by completing the table below.

Solar Habitat	Activity	Date (Month/Year)
	Order seeds	
In Progress Status	Start site prep (herbicide application)	
	Start soil prep (grading, discing, etc)	
	Plant seeds	
	Year 1 maintenance (mowing, weedeating or herbicide spot spraying)	
	First inspection (after two growing seasons)	
Certified Solar Site	Certified Solar Site signage displayed	
	Second inspection (after four growing seasons)	

APPENDIX D | South Carolina Pollinator Habitat Scorecard for Solar Sites

South Carolina Solar Habitat Scorecard

Below are questions that will be utilized to monitor Solar Habitat Sites following two and four growing seasons. A score of 70 is required to maintain recognition as "pollinator friendly".

1. Plant Diversity in Rows and Under Solar Arrays
    a. 4-6 species 5 pts
    b. > 7 species 8 pts
    c. All native species (at least 4) 10 pts

2. Vegetative Buffer Adjacent to Solar Site. Choose all that apply.
    a. There is a vegetative buffer outside of array fencing. 5 pts
    b. Buffer is at least 30 feet wide measured from array fencing. 5 pts
    c. Buffer is at least 50 feet wide measured from array fencing. 10 pts
    d. Buffer includes native shrubs/trees that provide food for wildlife. 5 pts

3. Number of Native Species in Site Perimeter and Buffer
    a. 4-6 species 5 pts
    b. 6-10 species 10 pts
    c. >10 species 15 pts

4. Percentage of Perimeter and Buffer Area Dominated by Native Plants
    a. 26-50% 2 pts
    b. 51-75% 10 pts
    c. > 75% 15 pts

5. The site has been checked for exotic and noxious weeds, and appropriate control measures put in place?
    a. Yes 15 pts
    b. No 0 pts

6. Percentage of Site Vegetation Cover Dominated by Wildflowers
    a. 26-50% 5 pts
    b. 51-75% 10 pts
    c. >75% 15 pts

7. Seasons with at Least Three Blooming Native Forb Species Present. Choose all that apply.
    a. Spring (April-May) 5 pts
    b. Summer (June-August) 5 pts
    c. Fall (September-October) 5 pts

8. Available Habitat Components within 0.25 miles. Choose all that apply
    a. Native bunch grass for bee nesting. 2 pts
    b. Native trees/shrubs for bee nesting. 2 pts
    c. Clean, perennial water sources. 2 pts
    d. Created habitat nesting features 2 pts

9. Site Planning and Management. Choose all that apply.
    a. Detailed management plan developed (required) 10 pts
    b. Signage legible at 40 or more feet stating pollinator friendly solar habitat 3 pts

10. Insecticide Risk. Points are deducted for the use of insecticides based on their toxicity to pollinators following groups designated by Clemson University's Department of Pesticide Regulation. https://www.clemson.edu/public/regulatory/pesticide-regulation/bulletins/bulletin-5-protecting-honeybees.pdf
    a. Group 1 Highest Toxicity -40 pts
    b. Group 2 Moderate Toxicity -20 pts
    c. Group 3 Relatively Non-toxic -5 pts